

## **The impact of climate variability on the beaches of Puget Sound**

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The nearshore geomorphology of Puget Sound is coupled to variations in wave and tidal characteristics in both space and time. We present an analysis of more than 100 years of tide records and 20 years of wind and atmospheric records that identify the mean and extreme levels, trends, and return intervals in characteristics of sea-level, tide ranges, surge, air pressure, wind speeds and waves throughout Puget Sound. The results indicate a strong regional correlation in atmospheric effects on sea level throughout Puget Sound and a tight coupling of the Sound with the eastern Pacific. Winter variations in mean sea level can exceed +/- 40 cm, and effects associated with ENSO cycles are greater than +20 cm during strong El Niños. The 100-year return level for mean 1-hour wind speed in the main basin of Puget Sound is greater than 25 m/s and would likely result in waves exceeding 1.5 meters in height (estimated). Finally, there appears to be a positive trend in maximum annual 1-hour wind speeds in Puget Sound (+28 cm/s per year) that corresponds to recent findings by Allan and Komar (2000) that storm wave heights off the Washington coast have been increasing over the past 20 years.